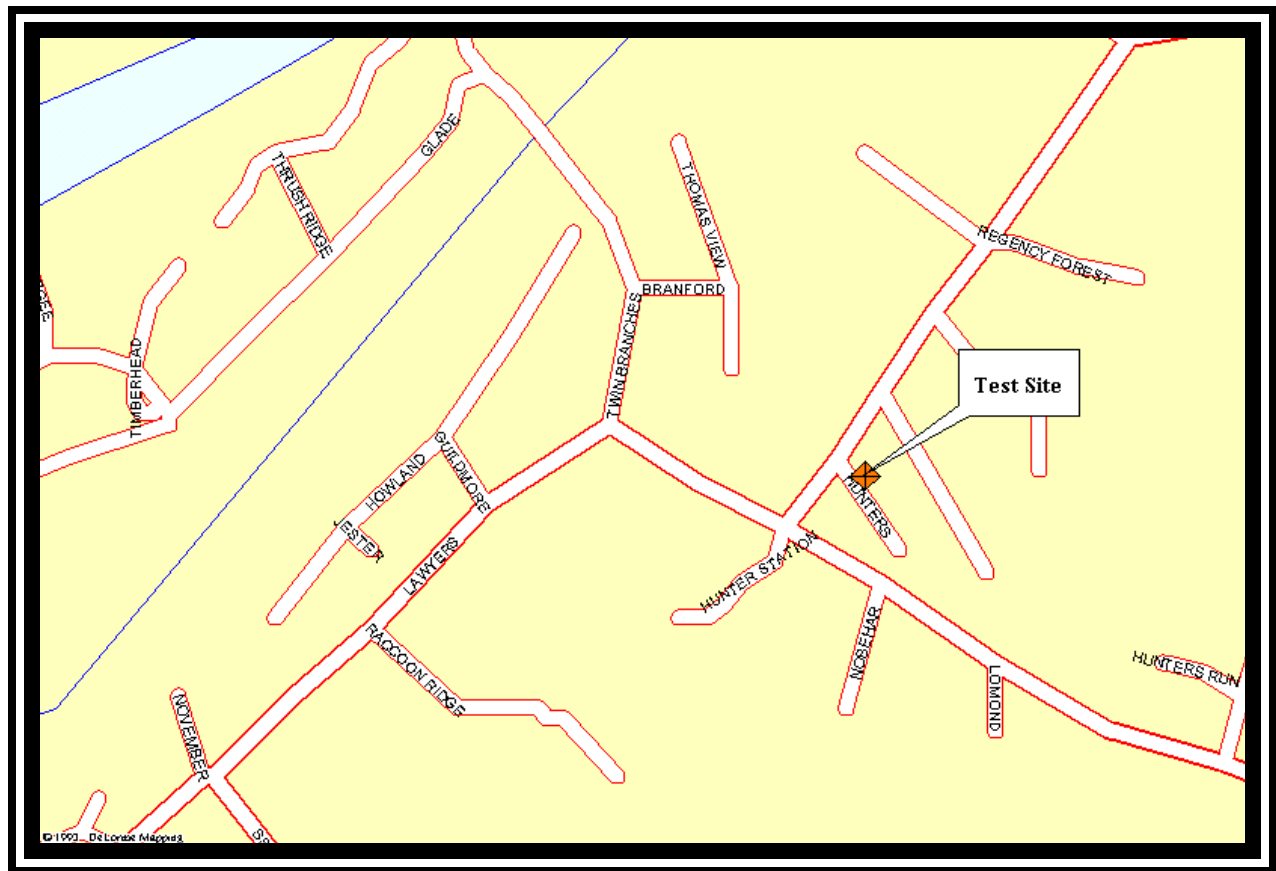


3.5 Reston, Virginia – 119 Feet SE of Intersection of Hunter Station and Hunters Place

- o Figure 3.5-1 presents a site data sheet including all pertinent site information and a site map.
- o Figure 3.5-2 is the photograph depicting the test site.
- o Figure 3.5-3 is the RF spectrum photographs depicting the interference environment at the test site.



Site Location: 119 feet SE of intersection of Hunter Station and Hunters Place in Reston, Virginia

Type Environment: Residential community, no major traffic,

GPS Coordinates (NAD 83): 38 55 39.2 N
77 19 09.5 W

Date/Time of Measurement: October 10, 2000/ 11:15 AM to 11:30 PM

Figure 3.5-1 Measurement Site Date Sheet



119 feet SE of intersection of Hunter Station and Hunters Place in Reston, Virginia

Figure 3.5-2 Test Measurement Site Photographs

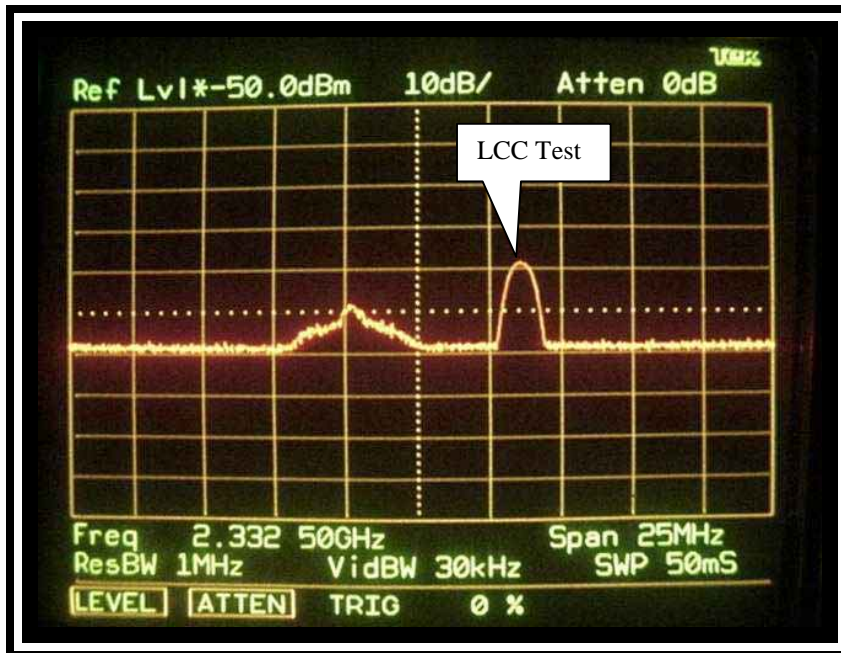
Hunters Place - Reston, Virginia

Reference
Level
dBm_I

XM Satellite Radio

Azimuth 0-360°

-70



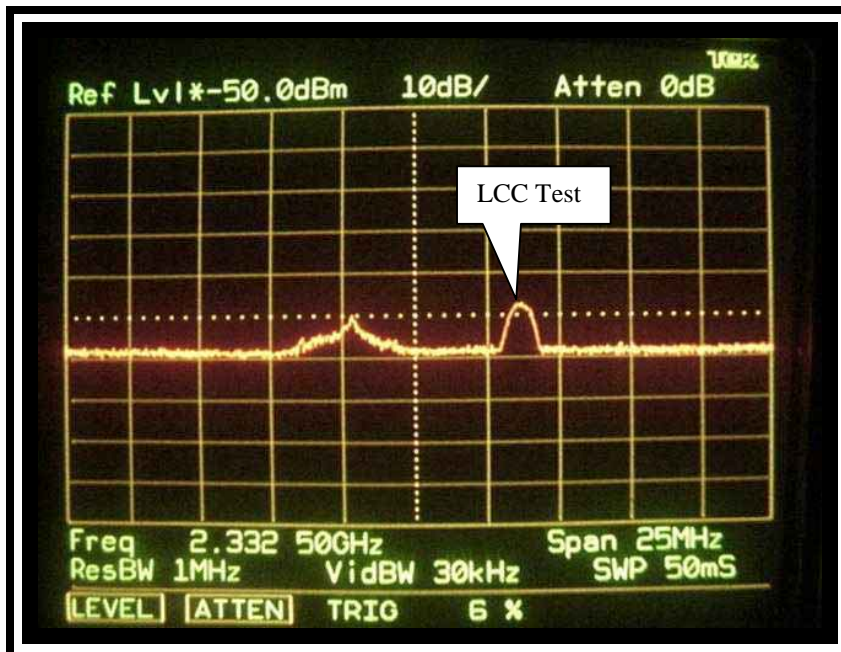
Date: October 10, 2000
Time of Day: 11:28
Ant. Polarization: V
Ant. Centerline: 5 Ft.

Full Antenna Sweep

(A)

Reference
Level
dBm_I

-70



Date: October 10, 2000
Time of Day: 11:30
Ant. Polarization: H
Ant. Centerline: 5 Ft.

Full Antenna Sweep

(B)

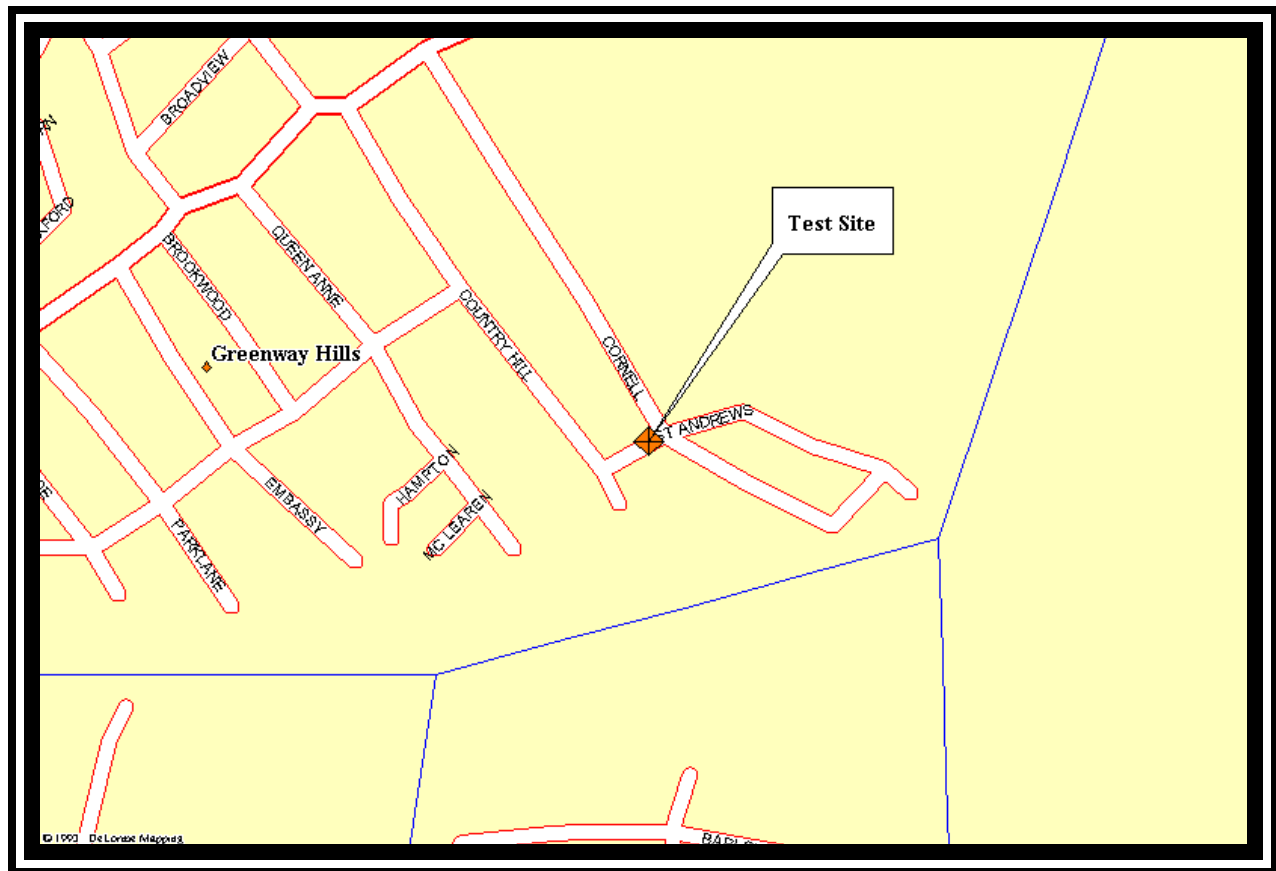
Figure 3.5-3 RF Spectrum Analysis

SECTION 3.6

Fairfax, VA

3.6 Fairfax, Virginia – Intersection of St. Andrews and Connell Road

- o Figure 3.6-1 presents a site data sheet including all pertinent site information and a site map.
- o Figure 3.6-2 is the photograph depicting the test site.
- o Figures 3.6-3 through 3.6-4 are the RF spectrum photographs depicting the interference environment at the test site.



Site Location: Intersection of St. Andrews and Connell Road Fairfax, Virginia

Type Environment: Residential

GPS Coordinates (NAD 83): 38 51 15.0 N
77 16 59.5 W

Date/Time of Measurement: October 10, 2000/ 5:15 PM to 5:40 PM

Figure 3.6-1 Measurement Site Date Sheet



Intersection of St. Andrews and Connell Road Fairfax, Virginia

Figure 3.6-2 Test Measurement Site Photographs

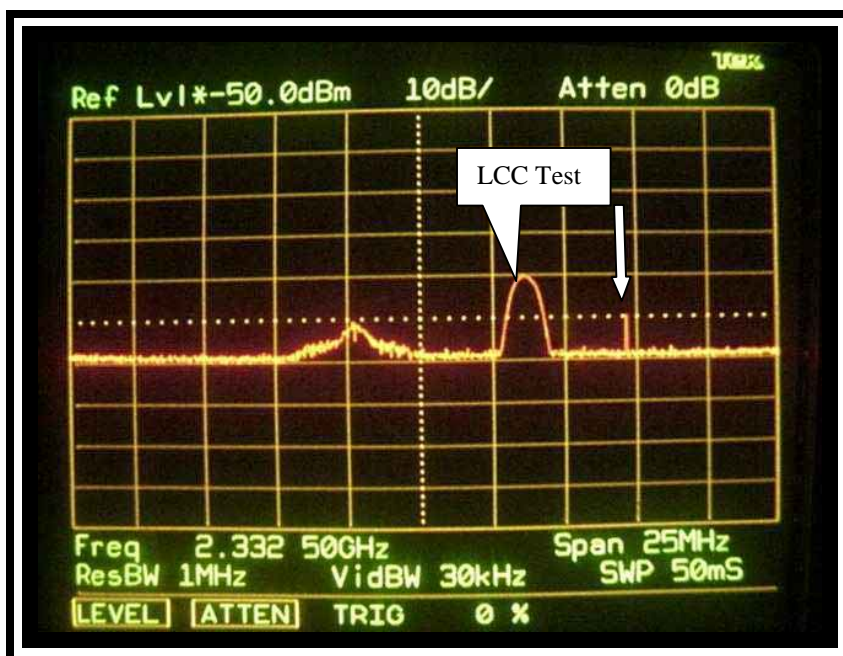
St. Andrews and Connell - Fairfax, Virginia

Azimuth 0-360°

Reference
Level
dBm_I

XM Satellite Radio

-70



Date: October 10, 2000

Time of Day: 17:26

Ant. Polarization: V

Ant. Centerline: 5 Ft.

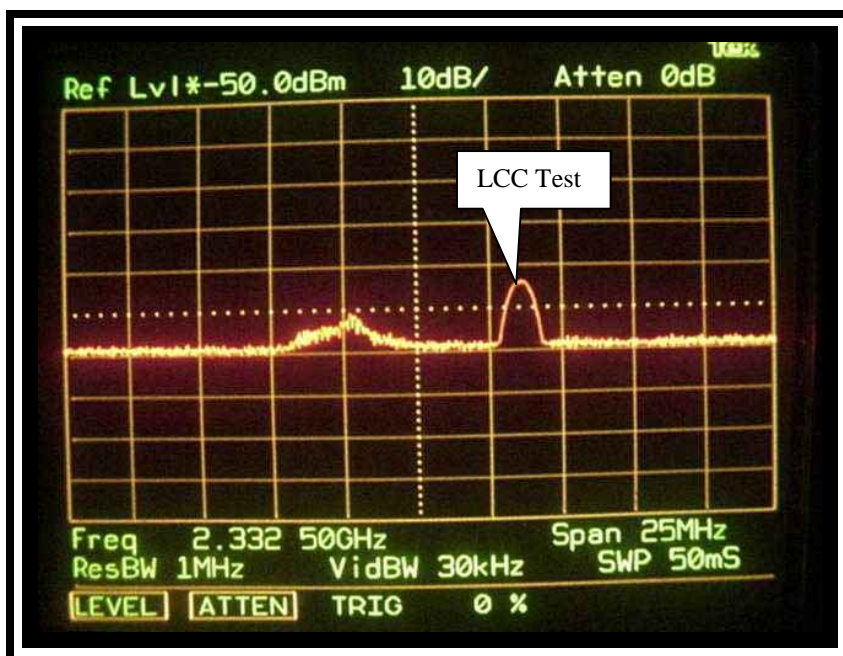
Full Antenna Sweep

Maximum ignition noise
interference signal measured
was -120 dBm at 2339.5 MHz
as indicated by arrow.

(A)

Reference
Level
dBm_I

-70



Date: October 10, 2000

Time of Day: 17:27

Ant. Polarization: H

Ant. Centerline: 5 Ft.

Full Antenna Sweep

(B)

Figure 3.6-3 RF Spectrum Analysis

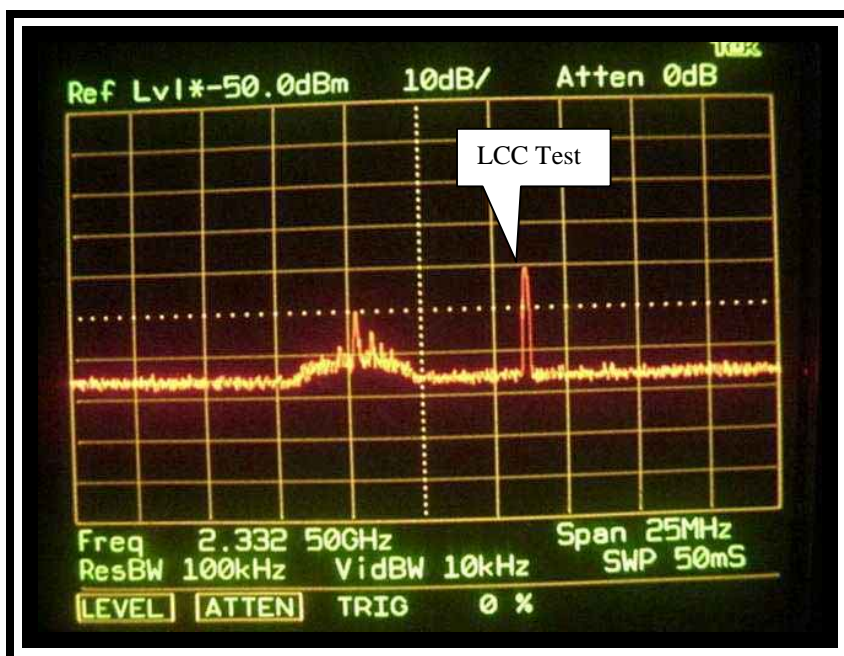
St. Andrews and Connell - Fairfax, Virginia

Azimuth 0-360°

Reference
Level
dBm_I

XM Satellite Radio

-70



Date: October 10, 2000

Time of Day: 17:31

Ant. Polarization: V

Ant. Centerline: 5 Ft.

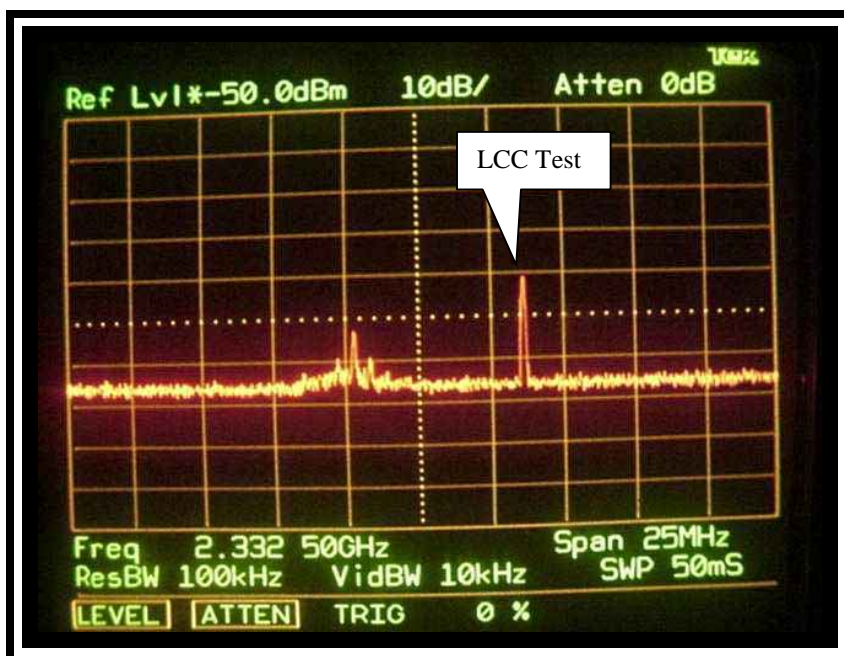
Full Antenna Sweep

100 kHz Resolution Bandwidth

(A)

Reference
Level
dBm_I

-70



Date: October 10, 2000

Time of Day: 17:29

Ant. Polarization: H

Ant. Centerline: 5 Ft.

Full Antenna Sweep

100 kHz Resolution Bandwidth

(B)

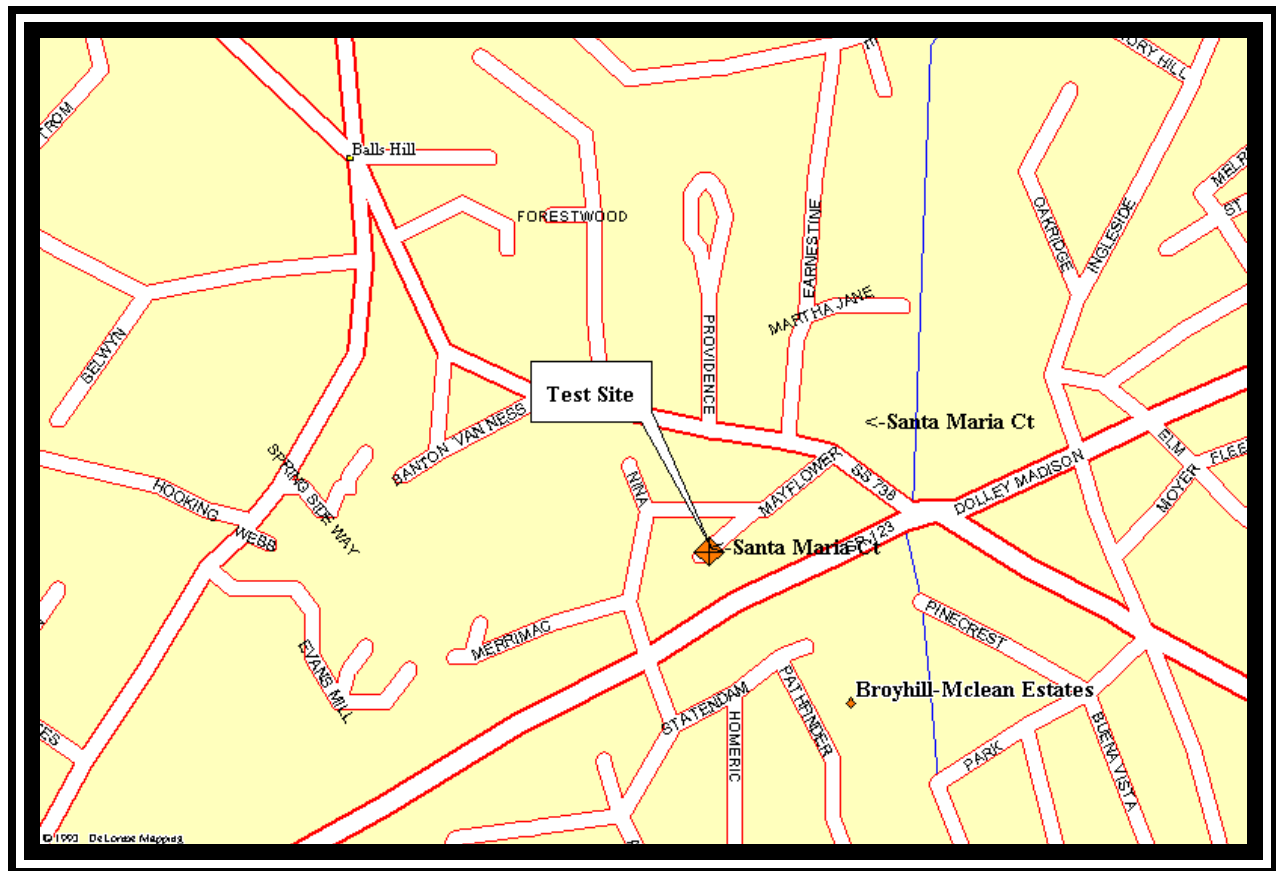
Figure 3.6-4 RF Spectrum Analysis

SECTION 3.7

McLean, VA

3.7 McLean, Virginia – Cul-De-Sac of Santa Maria Court off of Mayflower Drive

- o Figure 3.7-1 presents a site data sheet including all pertinent site information and a site map.
- o Figure 3.7-2 is the photograph depicting the test site.
- o Figures 3.7-3 through 3.7-4 are the RF spectrum photographs depicting the interference environment at the test site.



Site Location: Cul-De-Sac of Santa Maria Court off of Mayflower Drive in McLean, Virginia

Type Environment: Residential

GPS Coordinates (NAD 83): 38 56 02.9 N
77 11 24.1 W

Date/Time of Measurement: October 11, 2000/ 10:00 AM to 11:00 AM

Figure 3.7-1 Measurement Site Date Sheet



: Cul-De-Sac of Santa Maria Court off of Mayflower Drive in McLean, Virginia

Figure 3.7-2 Test Measurement Site Photographs

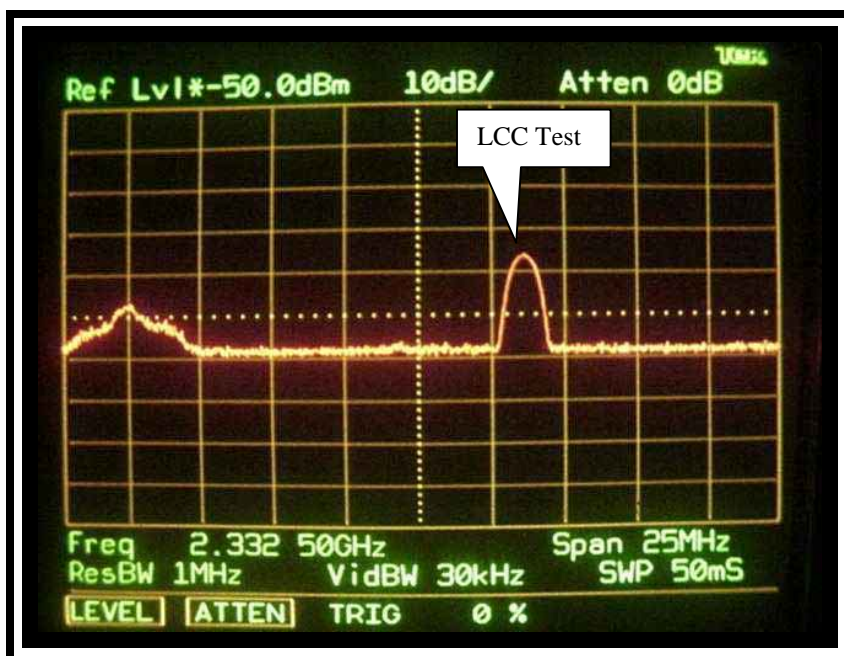
Santa Maria Court - McLean, Virginia

Azimuth 0-360°

Reference
Level
dBm_I

XM Satellite Radio

-70



Date: October 11, 2000

Time of Day: 10:37

Ant. Polarization: V

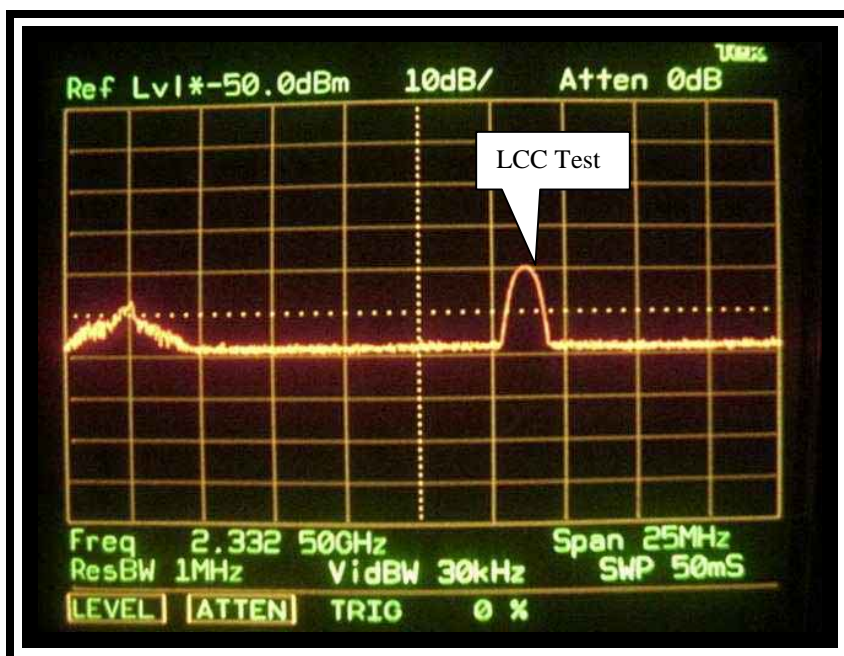
Ant. Centerline: 5 Ft.

Full Antenna Sweep

(A)

Reference
Level
dBm_I

-70



Date: October 11, 2000

Time of Day: 10:39

Ant. Polarization: H

Ant. Centerline: 5 Ft.

Full Antenna Sweep

(B)

Figure 3.7-3 RF Spectrum Analysis

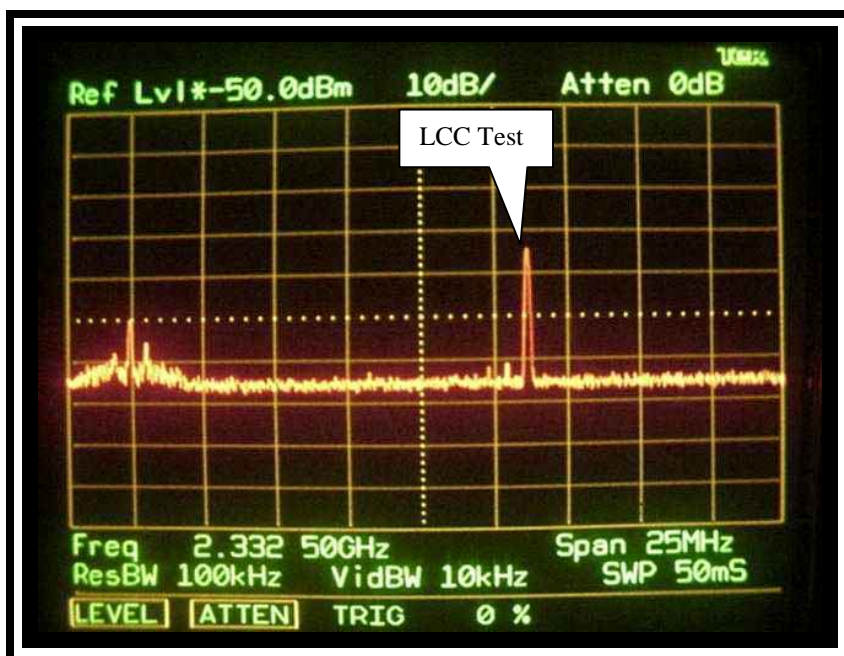
Santa Maria Court - McLean, Virginia

Azimuth 0-360°

Reference
Level
dBm_I

XM Satellite Radio

-70



Date: October 11, 2000

Time of Day: 10:43

Ant. Polarization: V

Ant. Centerline: 5 Ft.

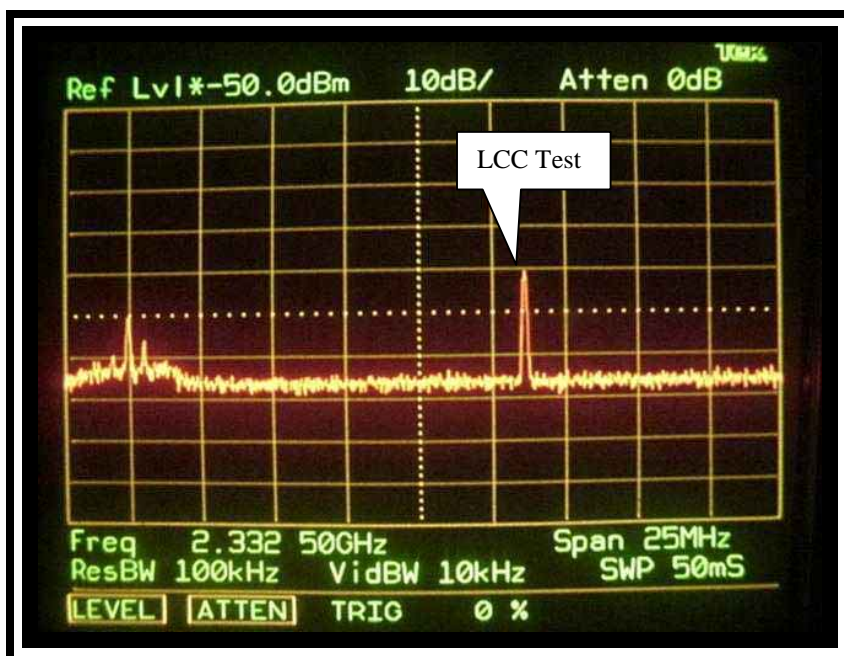
Full Antenna Sweep

100 kHz Resolution Bandwidth

(A)

Reference
Level
dBm_I

-70



Date: October 11, 2000

Time of Day: 10:41

Ant. Polarization: H

Ant. Centerline: 5 Ft.

Full Antenna Sweep

100 kHz Resolution Bandwidth

(B)

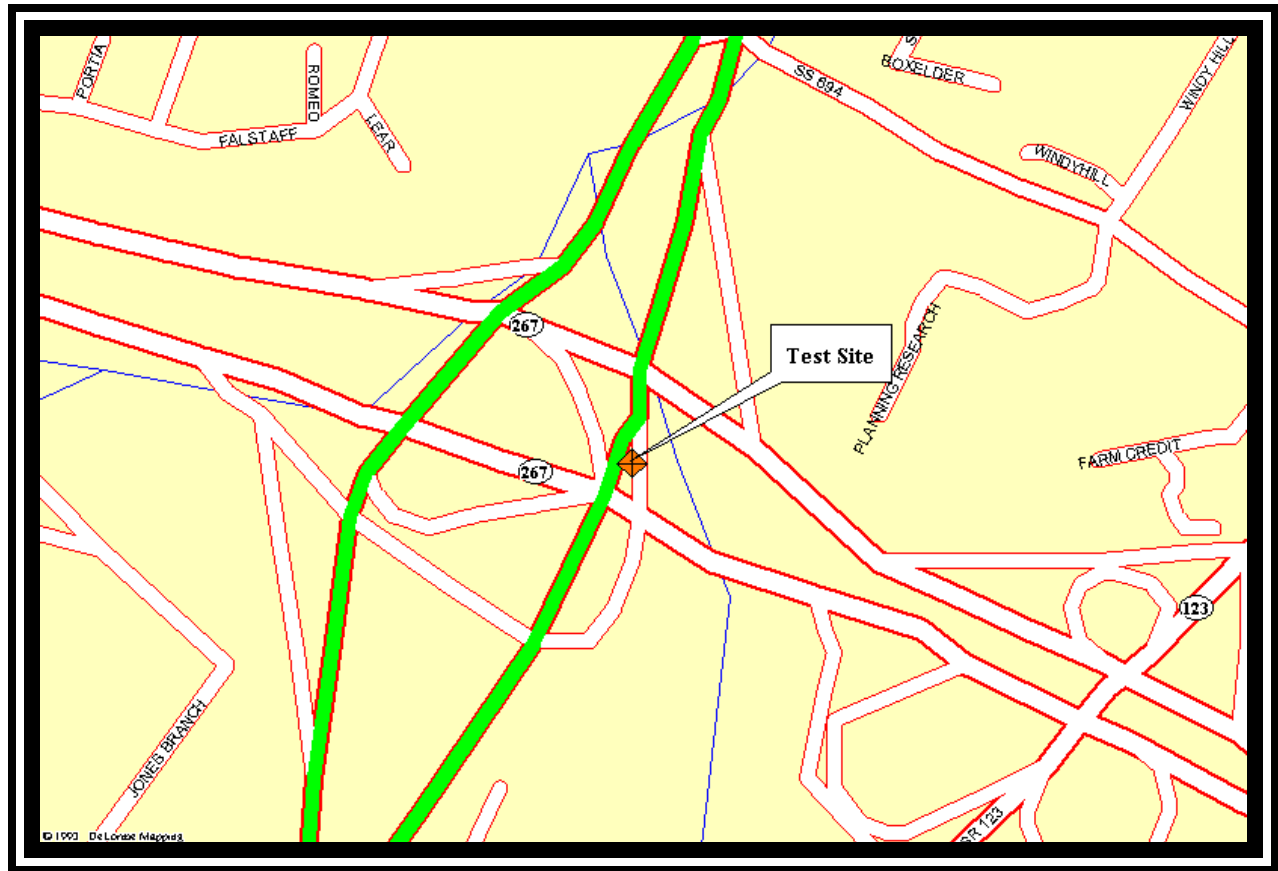
Figure 3.7-4 RF Spectrum Analysis

SECTION 3.8

Tyson's Corner, VA

3.8 Tysons Corner, Virginia – The approach onto the inside of I495 beltway from Dulles Toll road

- o Figure 3.8-1 presents a site data sheet including all pertinent site information and a site map.
- o Figure 3.8-2 is the photographs depicting the test site.
- o Figure 3.8-3 is the RF spectrum photographs depicting the interference environment at the test site.



Site Location: The approach onto I-495 (Inside of Beltway) from Dulles Toll road at Tysons Corner, Virginia.

Type Environment: Busy Interstate Highway

GPS Coordinates (NAD 83): 38 55 54.3 N
77 12 35.4 W

Date/Time of Measurement: October 18, 2000/ 11:30 AM to 12:00 AM

Engineering Comments: This site was chosen to show the expected ignition noise interference coming from high volumes of vehicle traffic.

Figure 3.8-1 Measurement Site Date Sheet



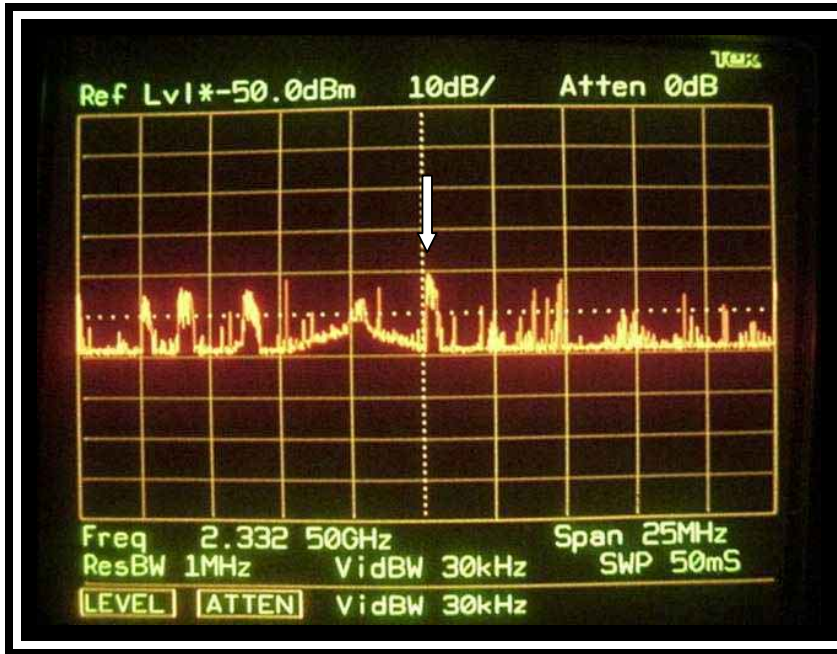
The approach onto I-495 (Inside of Beltway) from Dulles Toll road at Tysons Corner, Virginia.

Figure 3.8-2 Test Measurement Site Photographs

I495 and Dulles Toll Road - Tysons Corner, Virginia
Azimuth 0-360°
XM Satellite Radio

Reference
Level
dBm_I

-70



Date: October 18, 2000
Time of Day: 11:40
Ant. Polarization: V
Ant. Centerline: 5 Ft.

Full Antenna Sweep

Traffic passing within 25 feet of
the test antenna.

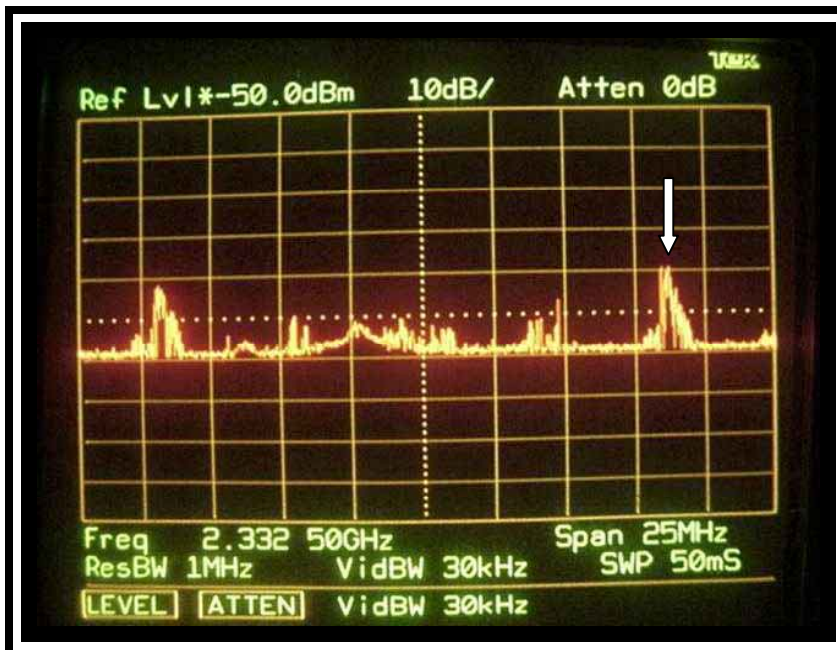
**Test antenna is peaked on
vehicles passing in front of the
test antenna.**

Maximum ignition noise
interference signal measured
was -110 dBm at 2332.8 MHz.

(A)

Reference
Level
dBm_I

-70



Date: October 18, 2000
Time of Day: 11:42
Ant. Polarization: H
Ant. Centerline: 5 Ft.

Full Antenna Sweep

Traffic passing within 25 feet of
the test antenna.

Maximum ignition noise
interference signal measured
was -109 dBm at 2341 MHz.

(B)

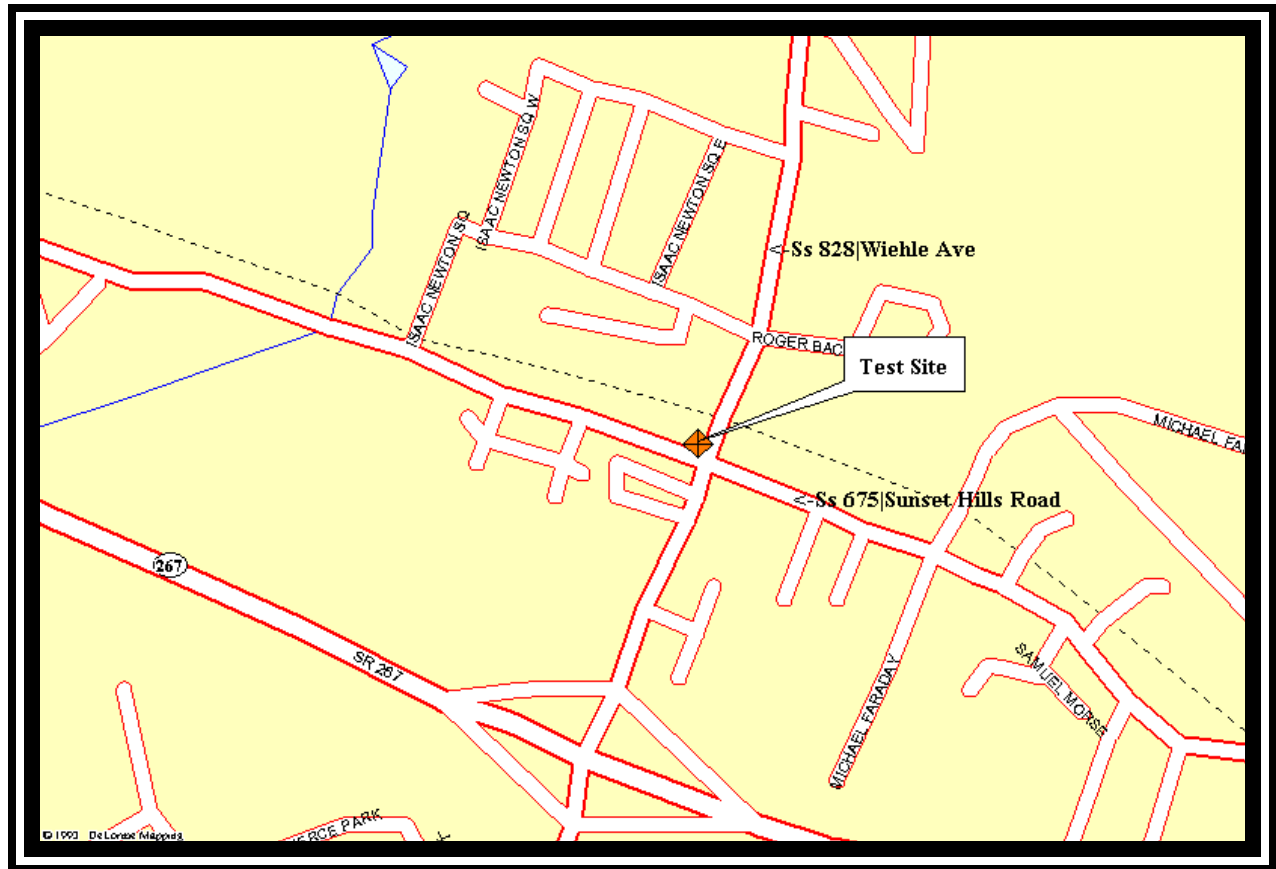
Figure 3.8-3 RF Spectrum Analysis

SECTION 3.9

Reston, VA

3.9 Reston, Virginia – Intersection of Sunset Hills and Wiehle

- o Figure 3.9-1 presents a site data sheet including all pertinent site information and a site map.
- o Figure 3.9-2 is the photographs depicting the test site.
- o Figures 3.9-3 through 3.9-6 are the RF spectrum photographs depicting the interference environment at the test site.



Site Location: Intersection of Sunset Hills and Wiehle, Reston, Virginia

Type Environment: Commercial Zone, Busy Road

GPS Coordinates (NAD 83): 38 57 01.2 N
77 20 10.4 W

Date/Time of Measurement: October 18, 2000/ 12:30 PM to 1:45 PM

Engineering Comments: A bus at the intersection provided a classic broadband ignition noise interference case as shown in Figure 3.10-6.

Figure 3.9-1 Measurement Site Date Sheet



Intersection of Sunset Hills and Wiehle, Reston, Virginia

Figure 3.9-2 Test Measurement Site Photographs

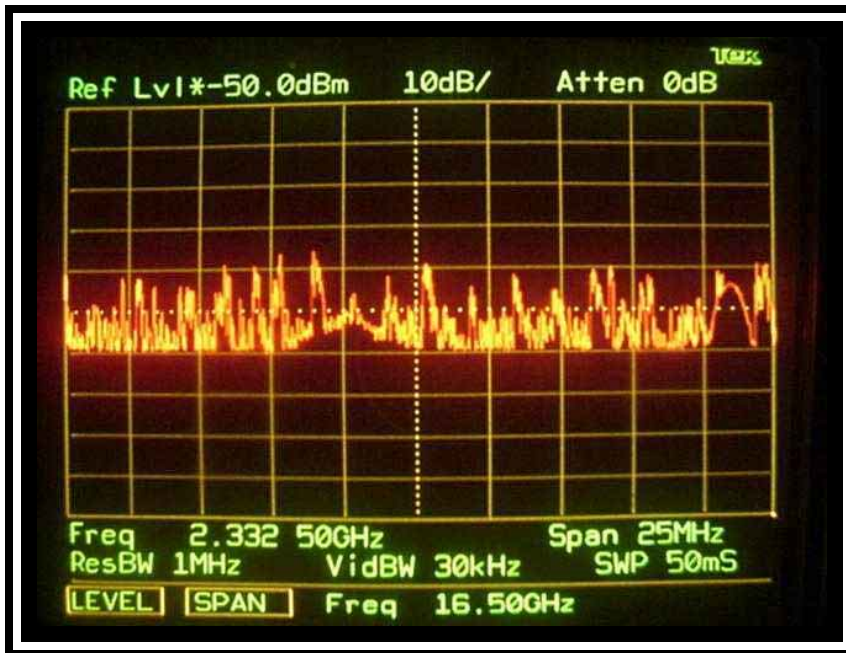
Sunset Hills and Wiehle - Reston, Virginia

Azimuth 0-360°

Reference
Level
dBm_I

XM Satellite Radio

-70



Date: October 18, 2000

Time of Day: 12:43

Ant. Polarization: V

Ant. Centerline: 5 Ft.

Full Antenna Sweep

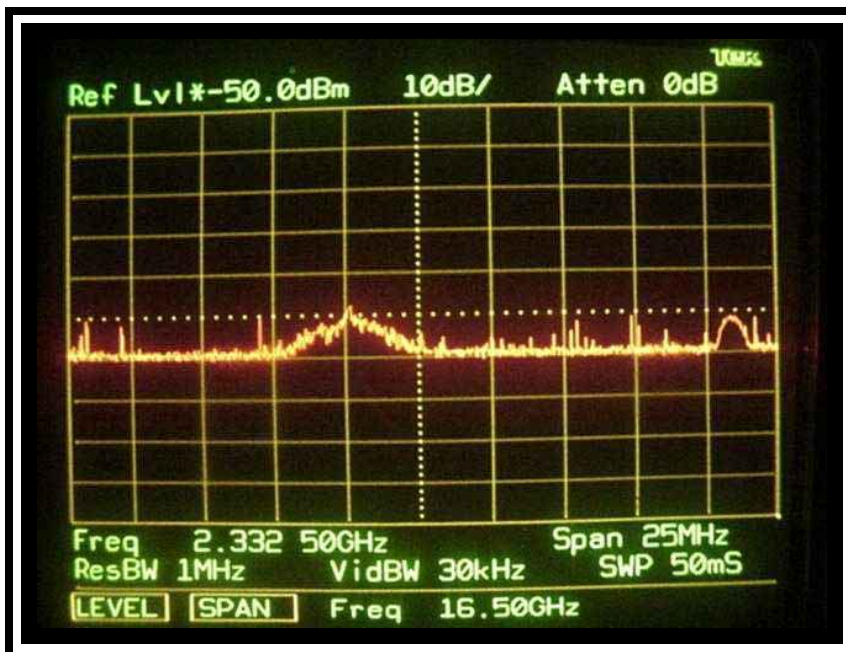
Traffic passing within 20 feet of the test antenna.

Maximum ignition noise interference signal measured was -108 dBm at 2329 MHz.

(A)

Reference
Level
dBm_I

-70



Date: October 18, 2000

Time of Day: 12:45

Ant. Polarization: H

Ant. Centerline: 5 Ft.

Full Antenna Sweep

Traffic passing within 20 feet of the test antenna.

Maximum ignition noise interference signal measured was -121 dBm at 2327 MHz.

(B)

Figure 3.9-3 RF Spectrum Analysis

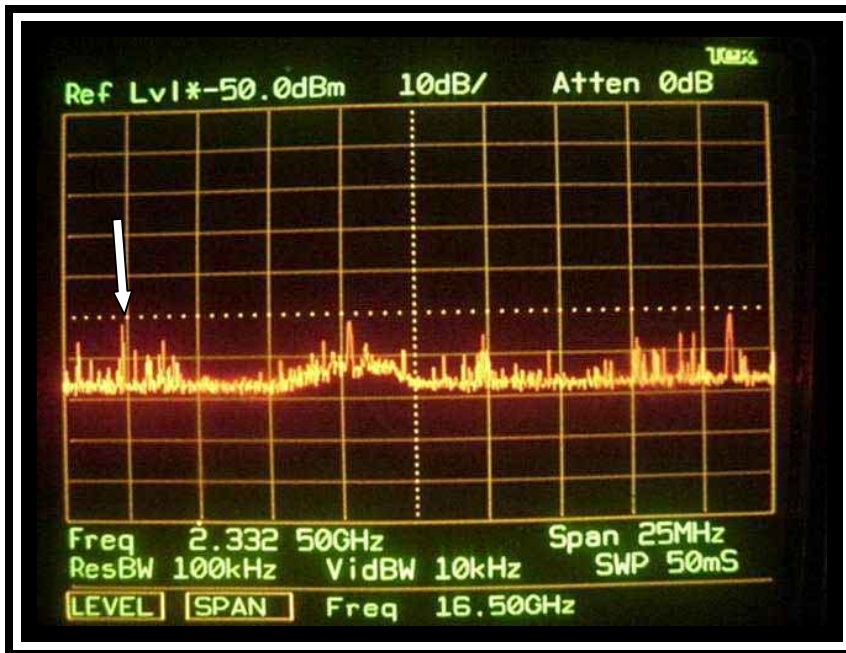
Sunset Hills and Wiehle - Reston, Virginia

Azimuth 0-360°

Reference
Level
dBm_I

XM Satellite Radio

-70



Date: October 18, 2000

Time of Day: 12:51

Ant. Polarization: V

Ant. Centerline: 5 Ft.

Full Antenna Sweep

100 kHz Resolution Bandwidth

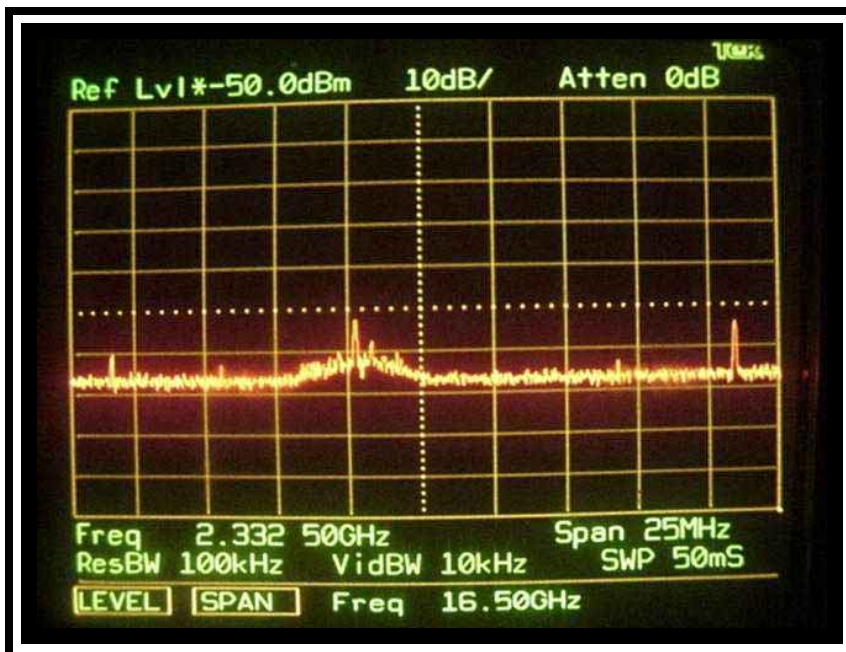
Traffic passing within 20 feet of
the test antenna.

Maximum ignition noise
interference signal measured
was -122 dBm at 2322.3 MHz.

(A)

Reference
Level
dBm_I

-70



Date: October 18, 2000

Time of Day: 12:49

Ant. Polarization: H

Ant. Centerline: 5 Ft.

Full Antenna Sweep

100 kHz Resolution Bandwidth

Traffic passing within 20 feet of
the test antenna.

Maximum ignition noise
interference signal measured
was -131 dBm at 2321.5 MHz.

(B)

Figure 3.9-4 RF Spectrum Analysis

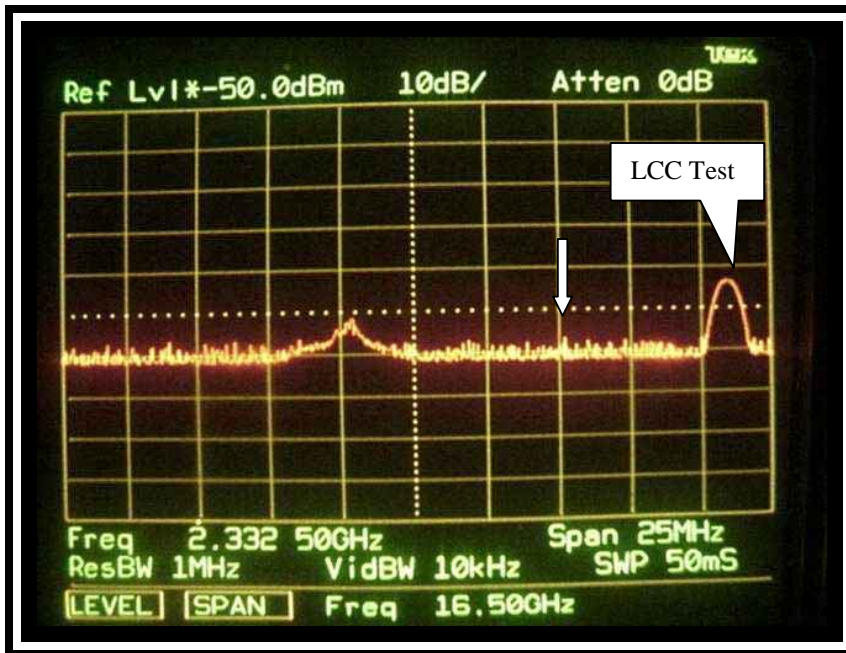
Sunset Hills and Wiehle - Reston, Virginia

Azimuth 145°/Elevation 10°

XM Satellite Radio

Reference
Level
dBm_I

-70



Date: October 18, 2000

Time of Day: 12:55

Ant. Polarization: V

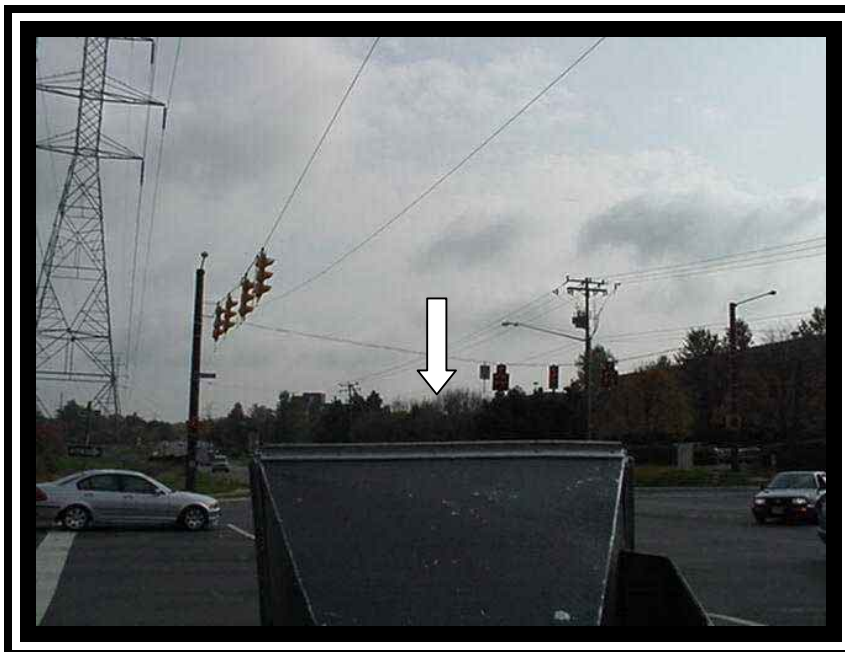
Ant. Centerline: 5 Ft.

Highest Recorded Signal:

MHz	Level (dBm _I)
2337.8	-125*

* Maximum vehicle ignition noise measured as indicated by arrow.

(A)



Photograph shows the direction of vehicle ignition noise measured above.

(B)

Figure 3.9-5 RF Spectrum Analysis

Sunset Hills and Wiehle - Reston, Virginia

Azimuth 80°/Elevation -2°

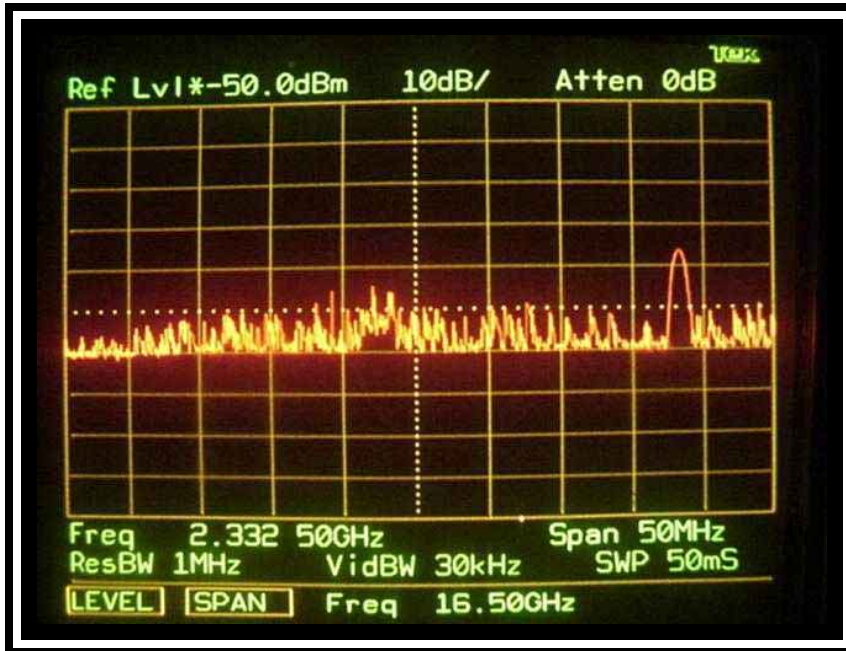
XM Satellite Radio

Reference

Level

dBm_I

-70



(A)

Date: October 18, 2000

Time of Day: 13:40

Ant. Polarization: V

Ant. Centerline: 5 Ft.

Test antenna is peaked towards the bus as pictured below. The bus is approximately 25 feet away.

Highest Recorded Signal:

MHz Level (dBm_I)

2329 -115.0*

*** Maximum vehicle ignition noise measured as indicated by arrow. Measurement frequency span increased to show broadband noise throughout spectrum.**



(B)

Photograph shows the bus that the broadband noise was coming from as viewed above.

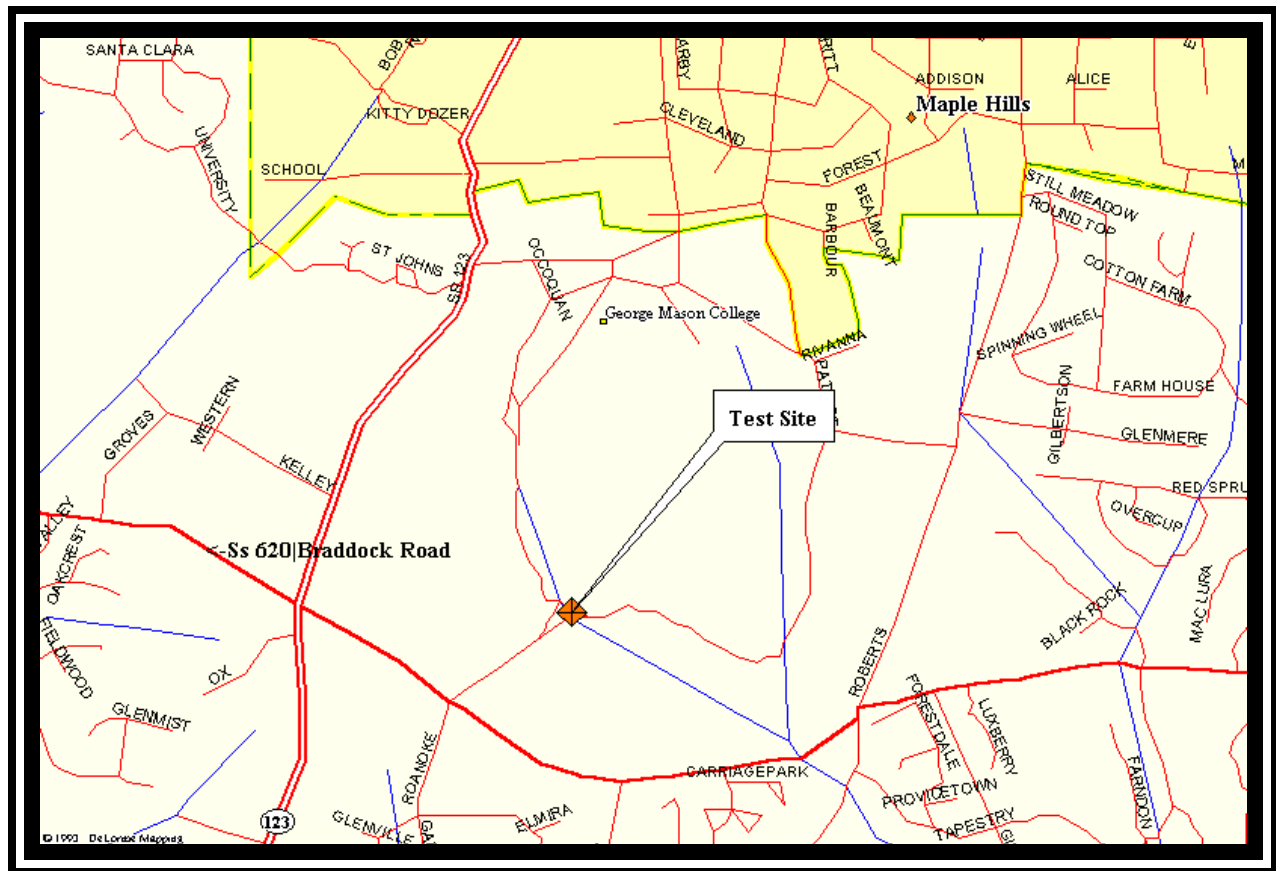
Figure 3.9-6 RF Spectrum Analysis

SECTION 3.10

Maple Hills, VA

3.10 Maple Hills, Virginia – George Mason University, on Roanoke Road by the Art Center

- o Figure 3.10-1 presents a site data sheet including all pertinent site information and a site map.
- o Figure 3.10-2 is the photographs depicting the test site.
- o Figures 3.10-3 through 3.10-4 are the RF spectrum photographs depicting the interference environment at the test site.



Site Location: George Mason University, Maple Hills, Virginia

Type Environment: College Campus

GPS Coordinates (NAD 83): 38 49 40.1 N
77 18 37.0 W

Date/Time of Measurement: October 19, 2000/ 12:00 AM to 12:30 AM

Figure 3.10-1 Measurement Site Date Sheet



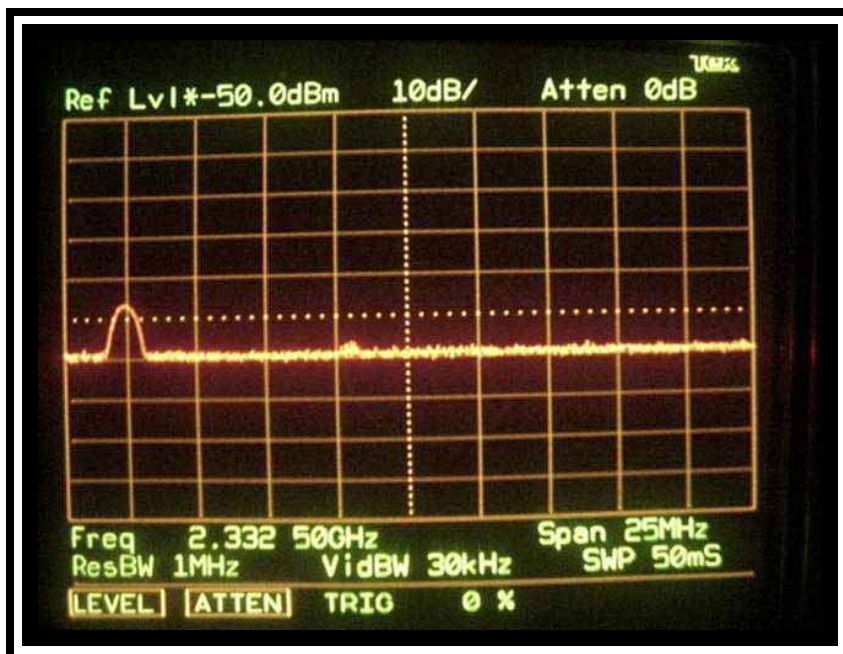
George Mason University, Maple Hills, Virginia

Figure 3.10-2 Test Measurement Site Photographs

Reference
Level
dBm_I

XM Satellite Radio

-70



Date: October 19, 2000

Time of Day: 12:04

Ant. Polarization: V

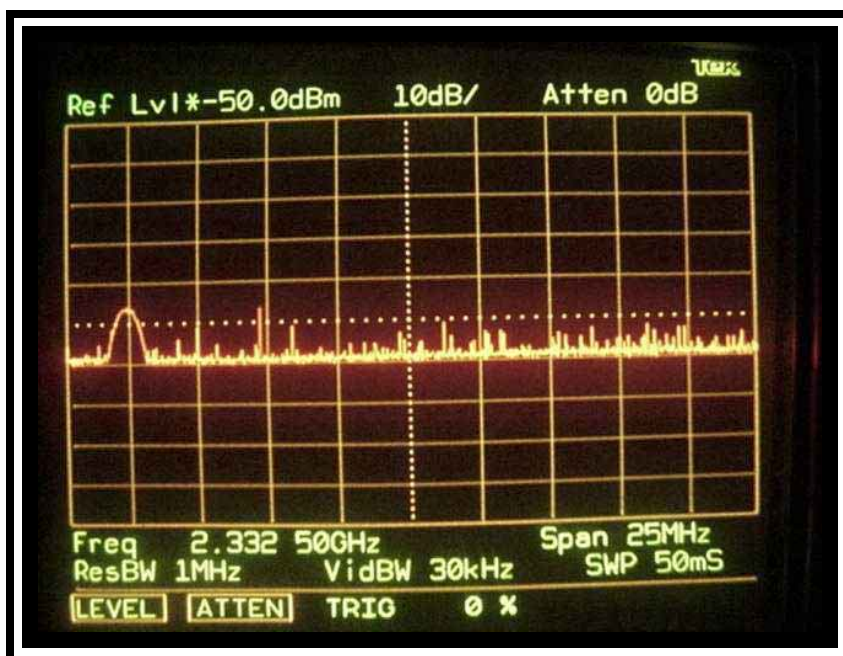
Ant. Centerline: 5 Ft.

Full Antenna Sweep

(A)

Reference
Level
dBm_I

-70



Date: October 19, 2000

Time of Day: 12:05

Ant. Polarization: H

Ant. Centerline: 5 Ft.

Full Antenna Sweep

Traffic passing within 10 feet of
the test antenna.

Maximum ignition noise
interference signal measured
was -116 dBm at 2327.25 MHz.

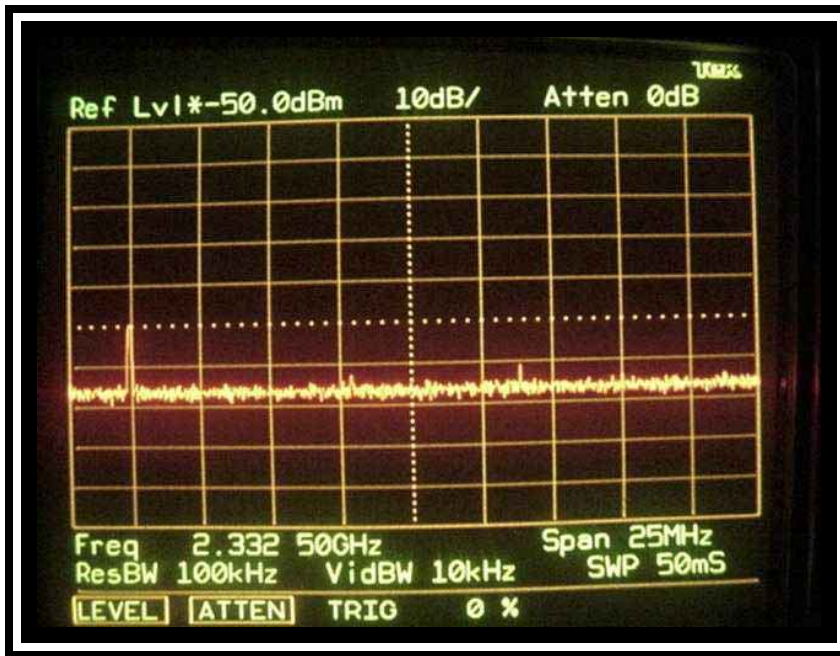
(B)

Figure 3.10-3 RF Spectrum Analysis

Reference
Level
dBm_I

XM Satellite Radio

-70



Date: October 19, 2000

Time of Day: 12:08

Ant. Polarization: V

Ant. Centerline: 5 Ft.

Full Antenna Sweep

100 kHz Resolution Bandwidth

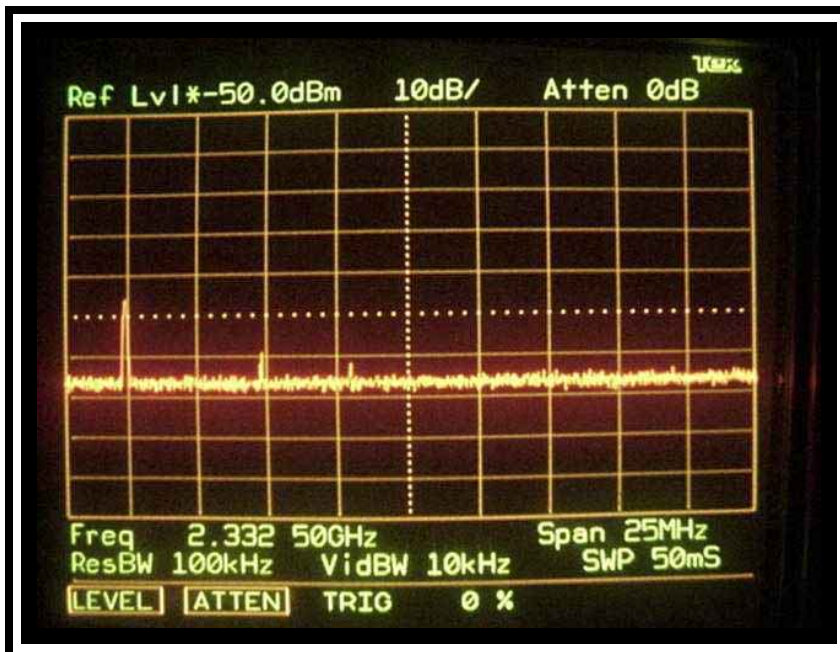
Traffic passing within 10 feet of
the test antenna.

Maximum ignition noise
interference signal measured
was -131 dBm at 2336.25 MHz.

(A)

Reference
Level
dBm_I

-70



Date: October 19, 2000

Time of Day: 12:06

Ant. Polarization: H

Ant. Centerline: 5 Ft.

Full Antenna Sweep

100 kHz Resolution Bandwidth

Traffic passing within 10 feet of
the test antenna.

Maximum ignition noise
interference signal measured
was -129 dBm at 2327.4 MHz.

(B)

Figure 3.10-4 RF Spectrum Analysis

SECTION

FOUR

SECTION 4

SUMMARY OF RESULTS

This section presents results of measurements performed at the 10 locations in Northern Virginia by Comsearch on behalf of XM Satellite Radio during the period of October 9 to October 19, 2000.

During the measurement period, testing of the terrestrial portion of the XM Satellite Radio network was being conducted by LCC. As these signals were being generated as part of the network testing and will not in themselves cause interference to XM Satellite Radio reception, the effect of these measured signals are not considered in these summary of results. The table below summarizes the relevant measured signals observed within the XM Satellite Radio band (2332.5 – 2345.0 MHz).

<u>Location</u>	<u>Frequency</u>	<u>Max Level/1MHz</u>	<u>Source</u>	<u>Figure</u>
<u>Baileys Crossroads</u>	<i>Broadband</i>	<i>-108 dBm</i>	<i>Vehicles Ignition</i>	<i>3.1-4A</i>
<u>Hechinger</u>	<i>Broadband</i>	<i>-120 dBm</i>	<i>Vehicles Ignition</i>	<i>3.2-3A</i>
<u>Surveyor Court</u>	2342 MHz	-124.6 dBm	Brinks Protection	3.3-5A
<u>Chestnut</u>	<i>Broadband</i>	<i>-122 dBm</i>	<i>Vehicles Ignition</i>	<i>3.4-3A</i>
<u>Hunters Place</u>	No interference found			
<u>St. Andrews</u>	<i>Broadband</i>	<i>-120 dBm</i>	<i>Vehicles Ignition</i>	<i>3.6-3A</i>
<u>Santa Maria Court</u>	No interference found			
<u>I-495</u>	<i>Broadband</i>	<i>-109 dBm</i>	<i>Vehicles Ignition</i>	<i>3.8-3B</i>

Location	Frequency	Maximum Level	Source	Figure
<u>Sunset Hills</u>	<i>Broadband</i>	<i>-108 dBm</i>	<i>Vehicles Ignition</i>	<i>3.9-3A</i>
	<i>Bus</i>	<i>-115 dBm</i>	<i>Bus Ignition</i>	<i>3.9-6A</i>
<u>George Mason Univ.</u>	<i>Broadband</i>	<i>-116 dBm</i>	<i>Ignition System</i>	<i>3.10-3B</i>

SECTION

FIVE

SECTION 5

CONCLUSIONS

The results of the electromagnetic measurements performed by Comsearch revealed that the main source of interference in the XM Satellite Radio frequency range of 2332.5 – 2345.0 MHz comes from vehicle ignition noise. Ignition noise levels are a function of both the proximity and number of vehicles present in the measurement area. In addition to the vehicle ignition noise measured at a number of sites, one (1) instance of a signal traced to a home intrusion alarm system was observed and documented. Its level was well below the EINL of the XM-Radio receiver. No other signals were detected in-band that could be considered an interference threat to XM-Radio reception.

Based on the measurements and data assessments performed during this project in the Northern Virginia area, it is concluded that the band of operation for the XM-Radio system is electromagnetically quiet enough at the present time to allow XM-Radio receivers to utilize it without suffering from degrading interference.